

## Chapter 13

# PLANS, SPECIFICATIONS AND ESTIMATE

### *Introduction*

To this point in the post-hearing project development process, each stage in design has focused primarily on certain aspects of the project building up to the Plans, Specifications, and Estimate (PS&E) stage.

The Preliminary design submissions tend to focus on the refinement of line and grade, the Slope and Drain level on the development of the drainage and ultimate slope limits such that Right-of-Way and Utility Coordination plans can be developed and the Preliminary PS&E plans on the development of the supporting plans (e.g. curbing and guardrail, and signing and striping plans, etc.), as well as the initial development of detailed quantities calculations, estimate and special provisions. Additionally, ongoing coordination is required with several bureaus to ensure that all aspects of the project are addressed appropriately.

The Plans, Specifications and Estimate (PS&E) package involves the complete check and coordination of all the plan elements, a review and coordination of the specifications used to control the work and an up to date estimate of the bid items, quantities and unit prices.

The Specifications are a compilation of the *Standard Specifications for Road and Bridge Construction (1)* and the Special Provisions, Supplemental Specifications, and Special Attentions found in the Proposal which contain requirements for the performance of the prescribed work along with other documents, including but not limited to, the Prosecution of Work (POW) and Traffic Control Plan (TCP).

After the PS&E plans have been finalized and prepared for advertising a complete design package is provided to Federal Highway Administration (FHWA) for overview projects to obtain pre-advertising approval and typically includes:

- Letter of transmittal;
- One (1) copy of Environmental Commitments Memo (from BOE);
- One (1) set of half-scale construction plans including cross sections;
- Two (2) copies of the Proposal (provided by the Bureau of Finance and Contracts);
- Three (3) copies of the PS&E Estimate;
- Right-of-Way Certificate, i.e., letter certifying clearance of Right-of-Way (provided by the Bureau of Right-of-Way);
- Utility Certificate, i.e., letter certifying completion of all required utility coordination (provided by Design Services);
- Two (2) copies of executed utility Force Account Agreements with cover letters (provided by Design Services); and,

- Disadvantaged Business Enterprise (DBE) goals (provided by the Labor Compliance Section of the Bureau of Human Resources).

**NOTE:** A PS&E Check List summarizing these elements for Federal overview and exempt projects is included later in this chapter as Appendix 13-5 in the Estimate Guidelines and is also available on the Project Programming homepage.

## ***Plans***

At the PS&E stage, the plans, cross sections, summary of quantities, estimate, and Proposal contents must be thoroughly crosschecked to avoid errors and omissions. As part of this process, construction notes on the plans are checked to see if they agree with those repeated on the sections and any summaries, (e.g., drainage and stone fill for inlet and outlet protection, described on the plans are cross checked with the sections and summaries). This check is known as the “3-way check” and is done just prior to sending the construction plans to the Print Shop. Another check is also completed following the 3-way check to verify whether all the bid items and quantities on the summaries agree with the estimate. In this check, all the item numbers are added up, then all the quantities are added up and both totals are compared between summaries and estimate. This check is known as the “Apples and Oranges Check”.

Environmental commitments, Right-of-Way agreements, actions resulting from utility relocation, commitments with coordinating agencies and specific project or program requirements must be complied with or the reason for noncompliance must be noted in the Project Book or Correspondence file.

Prior to the final submission of Wetland, Right-of-Way and Construction Plans the plan checklists (see Volume 2) should be reviewed to ensure appropriate detail is included. All items in the checklists may not be needed for a particular project. If an item is excluded it should be noted why to avoid future questions.

## ***Specifications***

The specifications describe the performance of the prescribed work. Each specification includes a description of what the item involves, the materials, construction requirements, method of measurement, basis of payment and pay items and units.

Specifications include the most current published *Standard Specifications for Road and Bridge Construction (1)*, Supplemental Specifications (considered standard but not yet bound into the current volume), and Special Provisions for items unique to the project.

Item terminology must be uniform, clear in description, and must agree between the estimate, plans, and specifications. The master item lists (English & Metric) can be found on the NHDOT website and in the Estimate Database.

Although the specifications describe the performance of the work, materials used and construction methods, the designer should adopt standard practices governing the use of the items in developing the plans. Matters of when to use certain items, how to calculate quantities, and what combinations of items to use to account for the work are discussed in Chapter 8.

## ***Estimate***

Estimates are processed at certain times (or at least once a year) throughout the design of the project to identify project costs, i.e., Preliminary Engineering, Right-of-Way, and Construction, and to update these costs for programming purposes. On Federal Aid projects, it is important to have an estimate processed authorizing Preliminary Engineering prior to charging time to the project to be sure FHWA has authorized the funding. As the design is developed and itemized quantities are identified, the estimated construction cost becomes more reliable; however, due to fiscal constraints, it is important that all project costs reflect updated information in whatever stage the project is at. Every estimate should consider the balance of Authorized PE and ROW and be adjusted after discussions with the Project Manager.

### **Format**

The “Estimate Guidelines” are provided in Appendix 13-1. The different types of estimates are described below:

- **PRELIMINARY ESTIMATE** - An informal estimate (not distributed), prepared by whomever is performing the preliminary design of the project, which is used to “program” the future construction cost and estimate costs for Preliminary Engineering (PE) and Right-of-Way (ROW) and possibly to identify reimbursable utility costs. The basis of the estimate includes approximate quantities for the major work (big ticket) items such as earthwork, pavement structure (which includes aggregate base course materials), bridges and other structures, and traffic signals. Other work such as drainage, traffic control, mobilization and miscellaneous items are estimated as a percentage of itemized construction costs based on projects of similar scope.
- **PROJECT AGREEMENT ESTIMATE (PAE) for PE/ROW** - The first formal (distributed) estimate used to authorize funding for Preliminary Engineering and Right-of-Way incidentals (appraisals, negotiations, etc.). Funding for Right-of-Way acquisition is usually programmed at this time based on an estimate provided by the Bureau of Right-of-Way. (Authorization for ROW acquisition costs is requested only when the ROW purchase plans are forwarded to the Bureau of Right-of-Way to initiate the acquisition process.) Any changes to the PAE for PE/ROW is called a “Modified Project Agreement Estimate for PE/ROW”, depending if changes are made to PE or ROW or both.
- **50% ESTIMATE** - This estimate is sometimes done to update the Preliminary Estimate and if more accurate information is available. If the scope of work changes significantly, a new estimate should be done that indicates revised construction costs along with changes to PE and ROW. Significant changes would include anything that required a revision to the Statewide Transportation Improvement Program (STIP). The title of the estimate will depend on what stage the project is in and whether changes to PE and/or ROW are required. The decision to prepare this estimate is made by the Project Manager in conjunction with the Section Chief.
- **PRELIMINARY PS&E ESTIMATE** - This is the first estimate that includes nearly final quantities for the majority of contract items and is prepared at about the 80% design stage. It usually includes 5-10% contingencies to account for missing or incomplete item quantities.

- **PS&E ESTIMATE** – This estimate Authorizes the project funding and is the last estimate prepared before advertising the project for bids and includes final quantities for all contract items, force account work, construction engineering, and any other project costs. When Finance and Contracts develops the Bid Schedule for the contract, the contact person will be required to check the item schedule vs. the PS&E body. Revisions to the PS&E estimate required prior to the bid opening is considered a “REVISED PS&E ESTIMATE.” This revised estimate may or may not be sent to FHWA depending on its significance. The Section Chief, Project Manager and/or Project Programming will decide if this estimate is routed to FHWA.
- **PROJECT AGREEMENT ESTIMATE (Based on Bid Prices)** - This estimate reflects the actual bid prices of the apparent “A-Bidder”. It follows the same format as the PS&E estimate and is prepared by the designer, normally within one week of receipt of the bids. All force account work should be Authorized by this time (if Force Account Agreements are or nearly executed). Funds for PE and ROW should also be updated at this time, as necessary. Any subsequent changes to this estimate after submission to FHWA is considered a “REVISED PROJECT AGREEMENT ESTIMATE (Based on Bid Prices).”

When a project is constructed by more than one contract, Preliminary PS&E, PS&E, and Project Agreement Estimates are prepared for each of the construction contracts. The status of all construction contracts (Contract A, Contract B... etc.) considered part of the project should be included with each estimate, either as previously Authorized construction funds or as Programmed funds for future contracts. In order to minimize the confusion of multiple construction contracts in a single estimate, it is common to set up separate accounting for the construction contracts by establishing new projects, usually identified by the same project number, with an alphabetical suffix. That way, each project will have its own estimate.

Federal-Aid participation will change as new laws and programs are instituted. The program under which the project qualifies should be checked for non-participating features and for the percentage of pro-rata support called for in the program. Consult the Section Chief or Project Programmer for assistance.

### Unit Prices

Estimates prepared prior to bid opening are based on the latest available list of contract item quantities and unit prices (the “body” of the estimate). The unit prices are generally based on the “Weighted Average Unit Prices” database.

The Weighted Average Unit Prices reflect actual bid prices for the majority of items used from previous projects and are categorized into different “Groups” as identified in the Estimate Guidelines. These unit prices are kept in a database, (G:\Database\Bur34\Estwork32.mdb & available on internet) and can be sorted in many ways to best reflect the use of the item being researched.

The “Weighted Average Unit Prices” database should only be used as a guide for determining unit prices for a project. It is the responsibility of the designer to use judgment to estimate the unit price for items. Actual bid prices for recent projects of similar size and scope are available within the same database and provide a more realistic view of the item cost. The “economic climate” may also be a factor influencing competition among bidders. Regional

projects are especially important to consider when material availability, contractor mobilization, and traffic control issues may be factors affecting the bids.

### ***(Bid) Proposal***

The Proposal is the assembled set of contract provisions including all contract information shown on the plans, or in the bound contract documents. The Specifications Engineer will normally prepare the proposal. The designer will be responsible for such elements of the proposal as the Supplemental Project Information Sheet, Prosecution of Work, Traffic Control Plan, ESAL, NPDES information sheet, and Section 105.12 – Work Zone Limits and will be involved in preparation of the remaining documents as needed (See Appendix 13-6 - Information to Specifications Engineer for Proposal):

- Prosecution of Work (POW)-- A document included in the Contract that gives the Contract Administrator & Contractor specific requirements and information unique to the project, allowing for the satisfactory performance of the work. It also includes the final and any intermediate completion dates. The POW is prepared by the Designer with assistance from others involved Sections or Bureaus (e.g. Design Services, ROW, Environment, Construction, etc.). There are several headings included in the POW (See Appendix 13-7), which describe various aspects of the proposed work. Some of the information contained in the POW is standard wording and applies to all projects, see specification section for standard wording to be sure the latest updates are being used. Information included in the POW should never duplicate that which is in the *Standard Specifications for Road and Bridge Construction (1)* or in a Special Provision. If appropriate, the Designer can make a statement in the POW regarding an issue then refer to a certain Specification or Special Provision for additional information.
- Traffic Control Plan (TCP) -- A document included in the Contract that gives the Contract Administrator & Contractor specific requirements and procedures for controlling traffic during the course of construction. It also allows the Contractor to submit, for approval, changes to the TCP. Some of the information contained in the TCP is standard wording and applies to all projects, see specification section for standard wording to be sure the latest updates are being used. (See Appendix 13-8)
- Special Attentions -- Notices calling bidders attention to issues applicable to an individual project such as historic or archeological impacts, materials handling, erosion, or environmental control not covered by a specific item.
- Special Provisions -- Additions and revisions to the Standard and Supplemental Specifications applicable to an individual project.
- Supplemental Project Information Sheet (See Appendix 13-9) - Describes the project and why it's needed, who or what process initiated it and traffic implications while under construction. This information is used for presentation of the contract to the Governor and Council and other Legislative members. This document shall only have English units shown, even if the project has metric units.
- Special Provision regarding the construction zone (See Appendix 13-10) -- Describes the limits of the Construction Work Zone(s).

Some of the documents in a Proposal for which the designer is responsible to request from others are:

- Permits -- NH Wetlands Bureau, US Army Corps of Engineers, Environmental Protection Agency, and other agencies as appropriate.

Some of the other documents in a Proposal for which the designer is not usually held responsible are:

- Invitation for Bids -- The advertisement describing the project in general terms;
- Information Report -- Contains bid opening date, DBE goals (if applicable), percent Federal Aid and list of contract items;
- New Hampshire Employment Security Office Address -- Source of unskilled labor, minority recruitment, and contractors' instructions;
- Wage Rates -- Minimum wages to be paid to various classes of workers, on Federal-Aid contracts;
- Supplemental Specifications -- Approved additions and revisions to the most current bound copy of the New Hampshire *Standard Specifications for Road and Bridge Construction (1)*;
- Minority Instructions -- Provisions for employing minority firms and subcontractors;
- On the Job Trainee Provisions -- Instructions regarding the Federal On the Job Training Program and the number of trainees for the project;
- Required Federal Contract Provisions -- Instructions about employment, materials record, subcontracting, safety, penalties for false statements, contract termination, environmental requirements, affirmative action plans, and other subjects; and,
- Contractual Provisions -- Include Contractors' affidavit, experience certification, blank bid schedule, minority commitment, and signature papers.

The Proposal does *not* contain the executed contract. When returned as a Bid, it is a bonded commitment that the Contractor will perform the work if awarded the contract. Before a Contract is signed, the Governor and Council must accept and approve the Bid. On Federally funded projects, FHWA must also approve the Bid and a Project Agreement must be executed between the State and FHWA.

### ***Revisions During Advertisement***

Questions from bidders regarding the bid documents (Proposal and plans) of a project are referred to the Lead Person for the project (usually the Project Manager or Bureau Administrator). If a response is required to clarify the bid documents or provide information that may affect the bid prices, it will be provided to all bidders in the form of an "addendum". Addendum(s) should be issued a minimum of seven (7) calendar days (preferably 10 calendar days) prior to the date that bids are opened.

The discussion regarding the need to issue an addendum should include the Lead Person and others (Section Chief, Design Team Leader (Highway and/or Bridge), Consultant Design Supervisor, District Construction Engineer, Specifications Engineer), as appropriate for the issue. Any other issue(s) that may affect the bidders' understanding of the bid documents

should also be discussed at this time. The Lead Person should notify the Bureau of Finance and Contracts that an addendum is being prepared.

The addendum is written by the Design Team Leader (Highway or Bridge), Consultant Design Supervisor or Specifications Engineer as appropriate for the issue(s). (See Appendix 13-11 for the format and sample.) All individuals involved in the initial discussions should review the addendum. The writer of the addendum should also notify the Bureau of Finance and Contracts of the approximate number of pages and the time frame in which it will be available.

The writer of the addendum is responsible to obtain FHWA approval of the addendum (for Federal overview projects) before requesting the signature of the Director of Project Development. (FHWA approval is not required for Exempt projects.)

The Specifications Engineer will obtain approval and signature from the Director of Project Development, then forward the addendum to the Bureau of Finance and Contracts for issuance to those who obtained bid documents for the project from that office.

If the addendum changes item numbers, adds or deletes items, it will require the Bid Schedule and information report to be revised and included as part of the addendum. The PS&E Estimate must be revised to reflect these changes for the bid opening and the Project Agreement Estimate that will be generated as a result of the bids. (See Appendix 13-11 for guidance regarding when to include the Information Report and Bid Schedule in the addendum.)

## ***Revisions After Advertisement***

There are situations that sometimes occur in a project after bids are opened that require changes to the plans or Proposal. If the project was designed by a Consultant for the Department and the Consultant no longer has the means to make changes to the project, the consultant supervisor shall review the changes with the Chief of Consultant Design to determine if the changes warrant Highway Design to stamp the plans that have changed. The changes(s) are addressed by either of the following:

**Alteration in Design:** A minor change to the contract document after the bids are opened.

Plan or Proposal:

These changes are generally minor alterations such as moving or adding catch basins; signs, etc. These changes can be made with a “Memo to Construction” explaining the revisions.

**NOTE:** In most cases, an Alteration in Design will not require direct changes to the plans. The Audit Section of the Bureau of Construction will make any plan changes when the “As-Built” Plans are developed.

**Revision after Proposal:** A major change to the contract document after bids are opened that require changes to the plans by the designer.

Plans:

1. Plan Sheets:

- a. Make mylar of the sheet prior to any changes (not necessary if changes will be made in Cadd.

This record reproducible is numbered as an “A” sheet and remains with the original plans as a record of what plans looked like prior to revision. Stamp this sheet “Superseded”.

- b. Revise the original plan(s) to reflect the new design or change in Cadd and make a new mylar.
- c. Complete title block to the left of the sheet outlining the revision.
- d. Stamp the original sheet or new sheet if done in Cadd “Revision After Proposal No. \_\_\_\_\_ Date\_\_\_\_\_”.

**NOTE:** A new sheet (not a replacement sheet) can be added as an “A” sheet. This new sheet should have the title block completed and be stamped “Revision After Proposal No. \_\_\_\_\_ Date\_\_\_\_\_”.

2. Cross Sections:

- a. Normally, these changes are minor and can be made by crossing out information and putting new data on the original sheet. If the change cannot be done clearly this way, use the procedure outlined for plans.
- b. Complete title block on the left of the sheet describing change.
- c. Stamp original sheet “Revision After Proposal No. \_\_\_\_\_ Date \_\_\_\_\_”.

3. Front Sheet:

- a. Stamp the front sheet “Revision After Proposal No. \_\_\_\_\_ Date \_\_\_\_\_”.
- b. Show the following data near the stamp:
  - Brief description of revision;
  - List of sheets revised, added or deleted; and,
  - Statement that “Quantities Affected Have (or Have Not) Been Revised”.

**NOTE:** On most “Revisions After Proposal”, the quantities or items will not change. If quantities do change, or items are added or deleted, the estimate may need to be revised to reflect these changes. Prepare a new estimate if directed by the Section Chief or Project Manager.

**NOTE:** Prior to distributing the revision (if the project has Federal overview), obtain approval of FHWA and send them one (1) set of 1/2 scale plans with cover letter.

4. Distribution (Print only revised or new sheets and front sheet)

- a. Prepare a cover letter to Construction explaining the revision and include the requested number of copies, (normally, 12 photographically reduced 1/2 scale and 2 full size sets. Verify the number required with the District Construction Engineer); and,
- b. Distribute the Revision After Proposal to others that received plans as part of original distribution.

## ***PROJECT COMPLETION***

Once a successful bidder is chosen and the Based on Bids estimate has been run, the project is turned over to the Construction Bureau. Highway Design's involvement will now be limited to support during construction, which is usually a minimal effort. If all coordination has been done and processes followed as outlined in this manual, the project should be successful, an improvement to the community and be a contributing element to a multimodal highway infrastructure.

### **References:**

1. New Hampshire Department of Transportation (NHDOT), *Standard Specifications for Road and Bridge Construction*, NHDOT, 7 Hazen Drive, Concord, N.H., March 2006

## ***APPENDICES***

- 13-1 Estimate Guidelines
- 13-2 Securing Federal Funding for Municipally Managed Projects (11/8/1999)
- 13-3 Utility Authorization Procedures (12/12/1996)
- 13-4 Guidelines on Preparing Engineers Estimate, Bid Reviews and Evaluation (1/20/2004)
- 13-5 PS&E Checklist (10/5/2006)
- 13-6 Information to Specifications Engineer for Proposal (11/17/2005)
- 13-7 Prosecution of Work (Guide)
- 13-8 Traffic Control Plan (Guide)
- 13-9 (Sample) Supplemental Project Information Sheet
- 13-10 (Sample) Construction Work Zone
- 13-11 (Sample) Addendum for Revisions After Advertisement
- 13-12 Drainage Note Format